

CONTROL AND COORDINATION

Question (1): *Why is control and coordination system necessary in organisms?*

Answer: All organisms have mechanisms to control their functions. However, in higher organisms the system required is more complex as the individual is a complex multicellular organism with the parts separated by greater distances.

Question (2): *What is homeostasis?*

Answer: Homeostasis comes from two words - 'homeo' meaning same and 'stasis' meaning steady state within the body.

Question (3): *Give examples of some of the movements shown by plants.*

Answer: Movements as in animals is absent in plants except in cases of sperm cells of ferns and mosses swimming towards the egg.

In plants, movement is associated with the growth of the plants. For example, the shoot system moves towards sunlight and the root system towards earth.

Question (4): *What are growth regulators?*

Answer: Growth regulators are the chemicals that either promote or inhibit growth of the plants, their development and their responses to the environment. They are also called the phytohormones.

Question (5): *What are the stages of growth in plants?*

Answer: Growth in plants has three stages: Cell division Cell enlargement Cell differentiation

Question (6): *Name the different phytohormones.*

Answer: The different phytohormones are auxins, gibberellins, cytokinins, ethylene and abscissic acid.

Question (7): *What are auxins?*

Answer: Auxins are phytohormones that are concerned with shoot and root elongation, maintaining dormancy and apical dominance.

Question (8): *Give four major functions of auxins.*

Answer: Four major functions of auxins are:

1) Elongation of stem and root: In high concentrations it causes stem elongation and in low concentration, it causes root elongation.

2) Apical dominance: As long as the apical buds produce auxins, the lateral buds are not allowed to grow.

3) Prevention of abscission: As long as the leaves and fruits produce auxin, they remain attached to the plant. If they stop producing auxins, they fall.

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4) Parthenocarpy: Auxins induce the ovaries to produce fruits without fertilisation and this is called parthenocarpy. It results in seedless fruits. For example, papaya, oranges, etc.

Question (9): What are gibberellins and where are they synthesized?

Answer: Gibberellins are plant hormones that are mainly responsible for cell elongation. They are synthesized in embryos, young leaves, root tips, buds and seeds.

Question (10): What is the most important commercial application of gibberellins?

Answer: GA-3 (gibberellic acid), a gibberellin that has been studied the most, causes the barley seeds to produce the starch-digesting enzymes like maltase, amylase. This process is called malting. It is used in the brewing industry.

Question (11): What are cytokinins? Give an example.

Answer: They are phytohormones that induce cell divisions even in mature tissues. They were named 'cytokinins' as the cell division is also called cytokinesis. For example: zeatin, a cytokinin present in maize grains

Question (12): Give one use of cytokinins in tissue culture.

Answer: Cytokinins are used in tissue culture to induce cell division in mature tissues.

Question (13): Name the phytohormone that causes ripening of fruits. Give one more function of this phytohormone.

Answer: The growth regulator that causes ripening is ethylene. It also promotes flowering.

Question (14): Name a growth inhibitor. Give two of its functions.

Answer: Abscissic acid is a growth inhibitor. Its functions are:
1) It causes bud and seed dormancy
2) It results in abscission of leaves and fruits

Question (15): What are the control and coordination mechanisms developed in animals?

Answer: The two control and coordination mechanisms developed in animals are: Nervous system
Endocrine system

Question (16): How does the conduction of messages take place in 1) Nervous system 2) Endocrine system

Answer: 1) The conduction in nervous system takes place with the help of electrical impulses travelling along the nerves

2) The conduction in endocrine system takes place by the hormones being circulated in blood

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Question (17): *What are the functions carried out by the nervous system in human beings?*

Answer: The functions carried out by the nervous system in human beings are:

- 1) It perceives the changes around us through our senses
- 2) It controls and coordinates all the activities of the muscles in response to the changes outside.
- 3) It also maintains the internal environment of the body by coordinating the functions of the various internal organs and the involuntary muscles.
- 4) It stores the previous experiences as memory that helps us to think and analyse our reactions.
- 5) It conducts messages between different parts of the body.

Question (18): *What are the units of nervous system?*

Answer: The units of nervous system are specialised cells called the neurons.

Question (19): *What is an impulse?*

Answer: An impulse is an electrical disturbance.

Question (20): *What are the two potentials that are generated while transmission of an impulse?*

Answer: The two potentials are resting potential and action potential.

Question (21): *What is a synapse?*

Answer: The junction between the axon and the dendrites of the next neuron is called the synapse.

Question (22): *What are nerve fibres?*

Answer: The long axons of neurons along with the associated structures are called the nerve fibres.

Question (23): *What are nodes of Ranvier?*

Answer: The nerve fibres may be enclosed within sheaths called as myelin sheath. Along the fibres there are regions where the myelin sheath is absent. These regions are called the nodes of Ranvier.

Question (24): *What are the three types of nerves?*

Answer: The three types of nerves are:

- 1) Sensory nerves or the receptor nerves - They are made up of only sensory neurons. For example, the cranial nerves that conduct impulses from the organs to the central nervous system.
- 2) Motor nerves or the effector nerves - They are made up of only motor neurons. For example, the cranial nerves that conduct impulses from the central nervous system to the motor nerves.
- 3) Mixed nerves - the nerves that are made up of both sensory and motor neurons. For example, all spinal nerves.

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Question (25): *What are receptors?*

Answer: Receptors are structures at the ends of the nerve fibres that collect the information to be conducted by the nerves.

Question (26): *What are effectors?*

Answer: Effectors are muscles or glands which work in response to the stimulus received from the motor nerves.

Question (27): *What are the three divisions of the human nervous system?*

Answer: Human Nervous system can be divided into:

- 1) Central nervous system
- 2) Peripheral nervous system
- 3) Autonomic nervous system

Question (28): *What is the central nervous system composed of?*

Answer: The central nervous system is made up of the brain and the spinal cord.

Question (29): *How are organs of the central nervous system protected?*

Answer: The organs of the central nervous system are protected by three membranes called the meninges and a fluid within these membranes called the cerebrospinal fluid. The latter acts like a shock absorber of the brain.

The brain is protected by the hard skull and the spinal cord is enclosed inside the bony vertebral column.

Question (30): *What is meningitis?*

Answer: The brain and the spinal cord are protected by membranes called the meninges. An infection of the meninges is called meningitis.

Question (31): *Name the different regions of the brain and their parts.*

Answer:

There are three main regions of the brain. They are:

- 1) Fore brain - It is made up of cerebrum, hypothalamus and thalamus
- 2) Mid brain - It is a relay centre
- 3) Hind brain - It consists of cerebellum, pons and medulla oblongata

Question (32): *What is cerebrum? What are its functions?*

Answer: Cerebrum is the largest part of the brain and is a part of the fore brain. It is made up of two hemispheres called the cerebral hemispheres. Cerebrum is responsible for the intelligence, thinking, memory, consciousness and will power.

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Question (33): What is the importance of hypothalamus?

Answer: Hypothalamus, a small region situated below the thalamus, is an important region of the brain. It carries out the following important functions:

- 1) It receives the taste and smell impulses.
- 2) It coordinates messages from the autonomous nervous system.
- 3) Controls the heart rate, blood pressure, body temperature and peristalsis.
- 4) It also forms an axis with the pituitary which is the main link between the nervous and the endocrine systems.
- 5) It also has centres that control mood and emotions.

Question (34): What are the functions of mid brain?

Answer: The functions of the mid brain are:

- 1) It serves as a relay centre for sensory information from the ears to the cerebrum.
- 2) It controls the reflex movements of the head, neck and eye muscles.
- 3) It provides a passage for the different neurons going in and coming out of the cerebrum.

Question (35): What is cerebellum? Where is it present? What are its functions?

Answer: Cerebellum is a part of the hind brain.

- 1) It is responsible for maintaining the balance while walking, swimming, riding, etc.
- 2) It is also responsible for precision and fine control of the voluntary movements. For example, actions like eating are possible while talking or listening

Question (36): What is the importance of medulla oblongata?

Answer: Medulla oblongata has the following functions:

- 1) It has the cardiovascular centre - It controls the rate and force of heart beat, blood pressure, constriction and dilation of blood vessels.
- 2) It has the breathing centre - it controls the involuntary breathing mechanism.
- 3) It also controls activities such as sneezing, coughing, swallowing, salivation and vomiting.

Question (37): What are the functions of spinal cord?

Answer: The functions of the spinal cord are:

- 1) Coordinating simple spinal reflexes
- 2) Coordinating autonomic reflexes like the contraction of the bladder
- 3) Conducting messages from muscles and skin to the brain
- 4) Conducting messages from brain to the trunk and limbs

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Question (38): *What are ganglia? Give an example.*

Answer: Ganglia are centres of collection of nerve cell bodies.
For example: dorsal root ganglion of the spinal cord

Question (39): *What is a reflex?*

Answer: When the stimulation of a receptor results in a spontaneous, involuntary reaction, it is called reflex action or simply reflex.

Question (40): *What are the two main types of reflexes? Give one example for each.*

Answer: The two main types of reflexes are:

- 1) Unconditioned reflex For example: moving away the hand on touching a hot object
- 2) Conditioned reflex For example: salivation at the sight of favourite food

Question (41): *What are exocrine and endocrine glands?*

Answer: Exocrine glands are those which pour their secretions into a duct.
For example, sweat glands, tear glands, etc.

Endocrine glands are those which are richly supplied with blood vessels and pour their secretions into the latter. The secretions reach their target through blood. These glands are called the ductless glands as they do not have ducts. For example, thyroid, adrenal, etc.

Question (42): *What are hormones?*

Answer: Hormones can be defined as secretions that are poured into blood in order to reach a specific target organ.

Question (43): *What are the characteristics of hormones?*

Answer: Hormones have the following characteristics:

- 1) they may be proteinaceous or non-proteinaceous (amino acids or steroids)
- 2) they are secreted as per need and not stored, only excreted
- 3) their secretion may be regulated by nerves or by feedback effect
- 4) they are transported by blood
- 5) they mostly cause long-term effects like growth, change in behaviour, etc.
- 6) they do not catalyse any reactions
- 7) they function by stimulating or inhibiting the target organs.

Question (44): *Name the various endocrine glands.*

Answer: The various endocrine glands are pituitary, pineal, thyroid, parathyroid, thymus, pancreas, adrenal and the gonads (ovaries and testes).

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Question (45): *What is TSH? Where is it produced?*

Answer:

TSH is thyroid stimulating hormone that stimulates thyroid to produce thyroxine. It is produced by the anterior lobe of the pituitary.

Question (46): *Which gland has both exocrine and endocrine parts?*

Answer: Pancreas has both exocrine and